

REMARKS

Claims 1-16 remain in this application. Claims 17-33 have been withdrawn.

Claim 1 is currently amended. No new matter has been added. In view of the Examiner's earlier restriction requirement, Applicant retains the right to present claims 17-33 in a divisional application.

In this Response, Applicant amends claims without prejudice and addresses the Examiner's rejections. Support for the amendments to the claims can be found throughout the application. Amendments to the claims are being made solely to expedite prosecution and do not constitute an acquiescence to any of the Examiner's rejections. Applicant's silence with regard to the Examiner's rejections of the dependent claims constitutes a recognition by the Applicant that the rejections are moot based on Applicant's remarks relative to the independent claim from which the dependent claims depend.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-16 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent Pub. No. 2002/0096680 to Sugano et al. (hereinafter "Sugano") in view of U.S. Patent Pub. No. 2002/0104750 to Ito (hereinafter "Ito") and U.S. Patent No. 5,591,668 to Maegawa et al. (hereinafter "Maegawa"). Applicant respectfully traverses this rejection. Applicant further submits that this rejection is moot in view of the current amendment.

The only independent claim pending, currently amended independent claim 1 is directed to "a method for processing a thin film sample, comprising the steps of", *inter alia*,

(b) masking the at least one beam pulse to produce at least one masked beam pulse, wherein at least one masked beam pulse is used to irradiate at least one portion of the thin film sample;

(c) with the at least one masked pulse, irradiating the at least one portion of the thin film sample with sufficient intensity for the at least one the portion to later crystallize; and

(d) allowing the at least one portion of the film sample to crystallize, the crystallized at least one portion being composed of a first area and a second area, wherein, upon the crystallization thereof, the first area includes a first set of grains, and the second area includes a second set of grains whose at least one characteristic is different from at least one characteristic of the first set of grains,

wherein the first area surrounds the second area, and is configured to allow an active region of an electric device to be provided at a distance therefrom and sized such that the width of the first area is at least ten times smaller than the width of the second area.

Legal Standard for Obviousness

To reject claims in an application under Section 103, an Examiner must establish a prima facie case of obviousness. Using the Supreme Court's guidelines enunciated in *Graham v. John Deere*, 383 U.S. 1, 17 (1966), one determines "obviousness" as follows:

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

In *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727 (2007), the Supreme Court reaffirmed the Graham test, and indicated that, although it should not be rigidly applied, a useful test for determining obviousness is to consider whether there is a teaching, suggestion or motivation in the prior art that would lead one of ordinary skill in the art to combine known elements of the prior art to arrive at the claimed invention. Importantly, the Court emphasized that a patent examiner's analysis under Section 103 should be made explicit in order to facilitate review.

Thus, to establish a prima facie case of obviousness, the Examiner has an obligation to construe the scope of the prior art, identify the differences between the claims and the prior art, and determine the level of skill in the pertinent art at the time of the invention. The Examiner must then provide an explicit, cogent reason based on the foregoing why it would be

obvious to modify the prior art to arrive at the claimed invention.

Applicant respectfully submits that the Examiner has failed to meet this burden to establish a prima facie case of obviousness for the rejection under 35 U.S.C. § 103(a). The Examiner admits that Sugano “fails to explicitly disclose wherein upon the crystallization thereof, the first area includes a first set of grains, and the second area includes a second set of grains whose at least one characteristic is different from at least one characteristic of the first set of grains.” *See* Office Action, pp. 3-4. Thereafter, the Examiner supports his claim of obviousness based solely on the claim that an “ordinary artisan would have been motivated to modify Sugano [by incorporating the teachings of Ito and Maegawa] for at least the purpose of facilitating the provision of the edge and center portions of the irradiated region [RGN] as disclosed by Sugano.” Applicant respectfully submits this rationale is insufficient as a matter of law to support a rejection under 35 U.S.C. § 103(a) for the reasons outlined below.

Sugano, Either Alone or in Combination with Maegawa or Ito, Does Not Disclose or Suggest All the Features of Amended Independent Claim 1

Sugano does not disclose or even suggest “allowing the at least one portion of the film sample to crystallize, the crystallized at least one portion being composed of *a first area and a second area*, wherein, upon the crystallization thereof, the first area includes a first set of grains, and the second area includes a second set of grains whose at least one characteristic is different from at least one characteristic of the first set of grains, *wherein the first area surrounds the second area*, and is configured to allow an active region of an electric device to be provided at a distance therefrom and sized such that the width of the first area is at least ten times smaller than the width of the second area.” In the Office Action the Examiner stated that the irradiated and crystallized region of Sugano “would obviously include an edge region and a center region.” *See* Office Action, p. 3. Applicant respectfully disagrees with this characterization. Indeed,

Sugano discloses the importance of complete uniformity of the irradiated region, stating, “the semiconductor thin film with the region RGN is *uniformly* polycrystallized, so as to obtain *uniform* device characteristics by forming thin film transistor using the semiconductor thin film as an active layer”; and “bulk irradiation of the prescribed region is conducted to make *uniform* the threshold value characteristics of the thin film transistors formed in the region.” *See* Sugano, paragraph [0059] (emphasis added). Moreover, the Examiner has not pointed out any portion of, or figure in, Sugano that discloses or suggests “an edge region and a center region.”

Furthermore, as stated above, the Examiner admits Sugano “fails to explicitly disclose wherein upon the crystallization thereof, the first area includes a first set of grains, and the second area includes a second set of grains whose at least one characteristic is different from at least one characteristic of the first set of grains.” *See* Office Action, pp. 3-4. Accordingly, Sugano does not disclose or suggest each and every feature of amended independent claim 1.

Similarly, Ito does not disclose or suggest “allowing the at least one portion of the film sample to crystallize, the crystallized at least one portion being composed of a first area and a second area . . . wherein the first area surrounds the second area, and is *configured to allow* an active region of an electronic device to be provided at a distance therefrom and *sized such that* the width of the first area is at least *ten times smaller* than the width of the second area.” Rather, Ito discloses a method of irradiating a thin film substrate three times to form a uniform crystalline structure, wherein after the first and second shots of the laser there are two regions, but the sizes of the two regions are on the same order of magnitude. Figures 22-25 of Ito illustrate one example of such a method, where after each successive shot of the laser, irradiated regions K1, K2, and K3 are formed, respectively. The size of all three regions K1, K2, and K3 are on the order of *five microns*. *See* Ito at paragraphs [0222] (“In the laser irradiated region K1,

the beam width is 5 μm .”), [0225] (“The laser irradiated region K2 is a square pattern having a beam width of 5 μm .”), and [0229] (“The laser irradiated region K3 is a square pattern having a beam width of 5 μm .”). Thus, Ito does not disclose a first area surrounding a second area “*sized such that* the width of the first area is at least *ten times smaller* than the width of the second area.”

Indeed, Ito teaches away from the above configuration by providing “a laser processing method and apparatus in which a polycrystalline Si film having a *uniform* and large particle diameter” *See* Ito at paragraph [0026] (emphasis added). Specifically, Ito sets forth the disadvantages placing a transistor on the micro-crystallized portion of the thin film sample. For example, Ito states the “boundaries of opposite ends of the region irradiated with the laser beam have a large particle diameter, but the middle portion is micro-crystallized. Then, a transistor is formed on the crystallized region, but the micro-crystallization forms an Si crystal film which *inhibits* enhancement of the capability of the transistor.” *See* Ito at paragraph [0022] (emphasis added). For this reason, Ito is directed to a method of multiple irradiations using various masks to eliminate the existence of two areas with differing crystalline characteristics by growing the large particle crystals through the micro-crystallized areas. Therefore, for at least the above reasons, Ito does not disclose or even suggest each and every feature of amended independent claim 1.

Maegawa does not disclose or even suggest “masking the at least one beam pulse to produce at least one masked beam pulse, wherein at least one masked beam pulse is used to irradiate at least one portion of the thin film sample.” Rather, Maegawa is directed to a method partially overlapping multiple irradiations of a thin semiconductor film, without the use of a mask. Specifically, Maegawa discloses a method to reduce the negative effects of the edge

region by performing multiple overlapping irradiations at an angle with respect to the beam profile. *See* Maegawa, Col. 3, line 66 - Col. 4, line 14. Indeed, the present application, at paragraphs [0008]-[0009], recognizes the disadvantages of the method disclosed by Maegawa.

Furthermore, Maegawa does not disclose or even suggest “allowing the at least one portion of the film sample to crystallize, the crystallized at least one portion being composed of a first area and a second area . . . wherein the first area surrounds the second area, and is *configured to allow* an active region of an electronic device to be provided at a distance therefrom and *sized such that* the width of the first area is at least *ten times smaller* than the width of the second area.” Rather, the method disclosed by Maegawa makes use of an unmasked beam where the ratio of the edge region to the center region is on the order of four-to-one. Specifically, the use of a “laser beam 1 having a region (with a size of 8 mm X 8 mm, for example)” would result in the “width of the edge portion 1a of the laser beam 1 [being] generally in the range of 1-2 mm.” *See* Maegawa Col. 3, lines 9-14. Maegawa seeks to solve the problem of the size of the edge region by use of multiple irradiations “while the laser beam is shifted in a direction inclined by $45^{\circ} \pm 30^{\circ}$ with regard to the straight-line portion included in the outline of the section of the laser beam.” *See* Maegawa Col. 4, lines 10-14. Therefore, for at least the above reasons, Maegawa does not disclose or even suggest each and every feature of independent claim 1.

There Would Be No Motivation to Combine Sugano with Ito or Maegawa

None of the above cited references, alone or in combination, disclose or even suggest a method that, *inter alia*, features “allowing the at least one portion of the film sample to crystallize, the crystallized at least one portion being composed of a first area and a second area, wherein, upon the crystallization thereof, the first area includes a first set of grains, and the

second area includes a second set of grains whose at least one characteristic is different from at least one characteristic of the first set of grains, wherein the first area surrounds the second area, and is configured to allow an active region of an electric device to be provided at a distance therefrom and sized such that the width of the first area is at least ten times smaller than the width of the second area.” Moreover, a person of ordinary skill would not be motivated to combine the above cited references. The Examiner has stated there would be a motivation for “at least the purpose of facilitation the provision of the edge and center portions of the irradiated region [RGN] as disclosed by Sugano.” *See* Office Action, p. 4. Applicant respectfully submits that this rationale both fails to meet the standard set forth in *Graham*, and moreover, is based on the flawed assumption that Sugano discloses any “edge portion.” As stated above, Applicant respectfully submits that Examiner has merely assumed an “edge portion” as disclosed in Sugano, where in fact Sugano neither discloses nor even suggests any such feature.

In addition, Sugano is directed to a method wherein “bulk irradiation of the prescribed region is conducted to make *uniform* the threshold value characteristics of the thin film transistors formed in the region.” *See* Sugano, paragraph [0059] (emphasis added). This is as opposed to Ito and Maegawa, which are both directed to methods that implement multiple irradiations to achieve uniformity of the crystalline structure. Therefore, a person of ordinary skill in the art at the time of the invention would not have been motivated to combine Sugano with either, or both, of Ito and Maegawa because of at least this fundamentally different approach to producing a uniform crystalline structure.

There Would Be No Reasonable Expectation of Success in Combining Any of the Prior Art

A person of ordinary skill in the art also would not have had any reasonable expectation of success in combining Sugano with either, or both, of Ito and Maegawa. As stated


above, Ito and Maegawa are methods directed to multiple irradiations of a thin film semiconductor to achieve uniformity, while Sugano is directed to a method of “bulk irradiation.” Thus, Sugano could not be combined with Ito or Maegawa with any reasonable expectation of success. Specifically, the method of Ito involves the use of multiple masks to irradiate the same portion of thin film repeatedly until uniformity has been achieved. Similarly, the method of Maegawa involves the use of a square-shaped beam that is moved in a lateral direction to conduct multiple overlapping irradiations. Such methods are not compatible with the bulk irradiation method disclosed by Sugano. Indeed, Sugano sets forth the flaws of such methods, stating that multiple irradiated portions have a problem where “the diameter of the individual crystal particles is different from the crystal particle diameter in the once irradiated region.” *See* Sugano, paragraph [0009]. For at least the above reason, a person of ordinary skill in the art would have no reasonable expectation of success in combining Sugano with either, or both, of Ito and Maegawa.

Therefore, for at least the above reasons, Applicant respectfully submits that the rejection of amended independent claim 1 under 35 U.S.C. § 103(a) as unpatentable over Sugano in view of Ito and Maegawa should be withdrawn. The rejections of claims 2-16 should also be withdrawn, as claims 2-16 all depend from claim 1, and are therefore patentable over the prior art for at least the same reasons discussed above.

CONCLUSION

Applicant does not believe that any additional fee is required in connection with the submission of this document. However, should any fee be required, or if any overpayment has been made, the Commissioner is hereby authorized to charge any fees, or credit any overpayments made, to Deposit Account 02-4377.

Respectfully submitted,



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